

# WILLAMETTE VALLEY FISH PASSAGE MONITORING – BULK MARKING & RESERVOIR DISTRIBUTION

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Bi-Weekly Report: November 16, 2023 – November 30, 2023



*Prepared for: United States Army Corps of Engineers*

*Prepared by: Cramer Fish Sciences*

December 7, 2023

## BULK MARKING SCHEDULE

Table 1. Tentative release schedule for brood year 2022. Green rows highlight the release groups that have been tagged and released so far this year. Orange rows highlight release groups that have been tagged but have not yet been released.

Release Year	Release Date (estimated)	Release Basin	Release Area	Release Location	Life stage	N
2023	February	North Santiam	Detroit Reservoir	Breitenbush River	fry	3750
2023	February	North Santiam	Detroit Reservoir	North Santiam River	fry	3750
2023	March	MF Willamette	Fall Creek Reservoir	Head of Reservoir	fry	5000
2023	March	MF Willamette	Lookout Point Reservoir	Head of Reservoir	fry	5000
2023	March	MF Willamette	Hills Creek Reservoir	Head of Reservoir	fry	5000
2023	March	SF McKenzie	Cougar Reservoir	Head of Reservoir	fry	5000
2023	March	SF McKenzie	Cougar Reservoir	Head of Reservoir	fry	5000
2023	March	MF Willamette	Fall Creek Reservoir	Head of Reservoir	fry	5000
2023	April	MF Willamette	Lookout Point Reservoir	Head of Reservoir	fry	5000
2023	April	North Santiam	Detroit Reservoir	Breitenbush River	fry	3750
2023	April	North Santiam	Detroit Reservoir	North Santiam River	fry	3750
2023	April	South Santiam	Green Peter Reservoir	Head of Middle Santiam Arm	fry	2500
2023	April	South Santiam	Green Peter Reservoir	Head of Quartzville Creek Arm	fry	2500
2023	April	MF Willamette	Hills Creek Reservoir	Head of Reservoir	fry	5000
2023	April	South Santiam	Green Peter Reservoir	Head of Middle Santiam Arm	fry	2500
2023	April	South Santiam	Green Peter Reservoir	Head of Quartzville Creek Arm	fry	2500
2023	August	South Santiam	Foster Reservoir	Tailrace	sub-yearling	1000
2023	August	South Santiam	Foster Reservoir	Head of Reservoir	sub-yearling	2000
2023	September	MF Willamette	Dexter Reservoir	Tailrace	sub-yearling	2000
2023	September	MF Willamette	Lookout Point Reservoir	Head of Reservoir	sub-yearling	5000
2023	September	MF Willamette	Lookout Point Reservoir	Forebay	sub-yearling	5000
2023	September	SF McKenzie	Cougar Reservoir	Head of Reservoir	sub-yearling	3000
2023	September	South Santiam	Green Peter Reservoir	Head of Middle Santiam Arm	sub-yearling	2500
2023	September	South Santiam	Green Peter Reservoir	Head of Quartzville Creek Arm	sub-yearling	2500
2023	October	North Santiam	Big Cliff Reservoir	Big Cliff Reservoir Tailrace	sub-yearling	8000
2023	October	North Santiam	Detroit Reservoir	Breitenbush River	sub-yearling	5000
2023	October	North Santiam	Detroit Reservoir	North Santiam River	sub-yearling	5000
2023	October	MF Willamette	Fall Creek Reservoir	Head of Reservoir	sub-yearling	5000
2023	October	MF Willamette	Fall Creek Reservoir	Tailrace	sub-yearling	1000
2023	October	SF McKenzie	Cougar Reservoir	Forebay	sub-yearling	5000
2023	October	SF McKenzie	Cougar Reservoir	Tailrace	sub-yearling	4000
2023	October	SF McKenzie	Cougar Reservoir	Head of Reservoir	sub-yearling	4000
2023	October	South Santiam	Green Peter Reservoir	Tailrace	sub-yearling	4000
2023	October	South Santiam	Green Peter Reservoir	Head of Middle Santiam Arm	sub-yearling	2500
2023	October	South Santiam	Green Peter Reservoir	Head of Quartzville Creek Arm	sub-yearling	2500
2023	October	South Santiam	Foster Reservoir	Tailrace	sub-yearling	4000
2023	October	South Santiam	Foster Reservoir	Head of Reservoir	sub-yearling	5000

Release Year	Release Date (estimated)	Release Basin	Release Area	Release Location	Life stage	N
2023	November	MF Willamette	Fall Creek Reservoir	Head of Reservoir	sub-yearling	5000
2023	November	MF Willamette	Fall Creek Reservoir	Tailrace	sub-yearling	1000
2023	November	North Santiam	Big Cliff Reservoir	Tailrace	sub-yearling	6000
2023	November	SF McKenzie	Cougar Reservoir	Forebay	sub-yearling	5000
2023	November	SF McKenzie	Cougar Reservoir	Tailrace	sub-yearling	4000
2023	November	SF McKenzie	Cougar Reservoir	Head of Reservoir	sub-yearling	4000
2023	November	MF Willamette	Hills Creek Reservoir	Head of Reservoir	sub-yearling	5000
2023	November	MF Willamette	Hills Creek Reservoir	Tailrace	sub-yearling	3000
2023	November	MF Willamette	Hills Creek Reservoir	Forebay or Mid Reservoir	sub-yearling	5000
2024	February	MF Willamette	Hills Creek Reservoir	Head of Reservoir	yearling	5000
2024	February	MF Willamette	Hills Creek Reservoir	Tailrace	yearling	3000
2024	February	MF Willamette	Hills Creek Reservoir	Forebay or Mid Reservoir	yearling	5000
2024	February	MF Willamette	Fall Creek Reservoir	Head of Reservoir	yearling	5000
2024	February	MF Willamette	Fall Creek Reservoir	Tailrace	yearling	1000
2024	March	MF Willamette	Lookout Point Reservoir	Head of Reservoir	yearling	5000
2024	March	MF Willamette	Dexter Reservoir	Tailrace	yearling	2000
2024	March	MF Willamette	Lookout Point Reservoir	Forebay	yearling	5000
2024	February	SF McKenzie	Cougar Reservoir	Forebay	yearling	2000
2024	February	SF McKenzie	Cougar Reservoir	Tailrace	yearling	1000
2024	February	SF McKenzie	Cougar Reservoir	Head of Reservoir	yearling	2000
2024	March	SF McKenzie	Cougar Reservoir	Forebay	yearling	2000
2024	March	SF McKenzie	Cougar Reservoir	Tailrace	yearling	1000
2024	March	SF McKenzie	Cougar Reservoir	Head of Reservoir	yearling	2000
2024	March	MF Willamette	Fall Creek Reservoir	Head of Reservoir	yearling	5000
2024	March	MF Willamette	Fall Creek Reservoir	Tailrace	yearling	1000
2024	March	MF Willamette	Lookout Point Reservoir	Head of Reservoir	yearling	5000
2024	March	MF Willamette	Dexter Reservoir	Tailrace	yearling	2000
2024	March	MF Willamette	Lookout Point Reservoir	Forebay	yearling	5000
2024	April	North Santiam	Big Cliff Reservoir	Tailrace	yearling	2000
2024	April	North Santiam	Detroit Reservoir	Breitenbush River	yearling	2000
2024	April	North Santiam	Detroit Reservoir	North Santiam River	yearling	2000

## BULK MARKING SUMMARY

The Bulk Marking project released the final group of brood year 2022 subyearlings on 20 November 2023. That group, consisting of 6,000 fish, was released into Big Cliff Dam tailrace located on the North Santiam River (Table 3). After completing the final release of 2023, the crew refocused their attention on tagging the remaining brood year 2023 fish that are slated for release as yearlings during the spring of 2024.

## Recaptures

A total of 553 PIT tagged juvenile Chinook salmon were recaptured or otherwise observed passing PIT tag arrays during this reporting period. The majority of observations occurred at the Cougar RO rotary screw

trap (n = 453) and the Hill Creek Dam Regulating Outlet tailrace rotary screw trap (n = 37). In addition, there were 39 PIT tags detected at the Lebanon Dam PIT tag array, with 18 observed at the Diversion Bypass, 11 observed at the North Ladder, 9 observed at the South Ladder, and 1 observed at the Spillway. We estimate that a total of 2,268 PIT tagged fish from this project have been detected so far this year (Table 4).

Table 2. Bulk marking summary statistics. Total number of fish marked (N), mean fork length (FL), mean weight, start date of marking, end date of marking, total mortalities from start of tagging to release, mortality percentage, total shed tags from start of tagging to release, and shed tag percentage.

Mark Group	N	Mean FL (mm)	Mean Weight (g)	Date Start	Date End	Mor ts	Mort. %	Sheds	Shed %
Green Peter Head of Reservoir - Middle Santiam Arm	5,071	56.1		5/15/2023	5/16/2023	74	1.46	32	0.63
Green Peter Head of Reservoir - Quartzville Creek Arm	5,203	58.5		5/17/2023	5/18/2023	18	0.35	19	0.37
Lookout Point Head of Reservoir	10,041	63.1	2.9	5/22/2023	5/24/2023	39	0.39	53	0.53
Hills Creek Head of Reservoir	10,117	64.6	2.9	5/30/2023	6/1/2023	22	0.22	9	0.09
Fall Creek Head of Reservoir	10,040	67.3	3.2	6/1/2023	6/7/2023	68	0.68	30	0.30
Detroit Head of Reservoir - Breitenbush Arm	7,530	66.9	3.6	6/13/2023	6/14/2023	70	0.92	24	0.32
Detroit Head of Reservoir - North Santiam Arm	7,528	66.9	3.6	6/14/2023	6/15/2023	70	0.92	25	0.32
Cougar Head of Reservoir	5,626	67.7	3.5	6/20/2023	6/21/2023	475	8.4	44	0.78
North Santiam Basin – Fall 2023 and Spring 2024	30,680	67.3	3.5	6/26/2023	7/20/2023	TBD	TBD	TBD	TBD
Middle Fork Willamette – Fall 2023 and Spring 2024	60,940	NA	NA	7/26/2023	8/9/2023	TBD	TBD	TBD	TBD
South Santiam Basin – Fall 2023	23,706	NA	NA	8/14/2023	8/23/2023	TBD	TBD	TBD	TBD
McKenzie Basin – Fall 2023	36,001	NA	NA	8/30/2023	9/08/2023	TBD	TBD	TBD	TBD

Table 3. Release summary statistics. Date of release, number of marked fish released, transport tank water temperature and the beginning and end of the transport, and water temperature at the release location.

Release Location	Release Date	N	Transport Temp Start	Transport Temp End	Release Site Temp
Green Peter Head of Reservoir - Quartzville Creek Arm	5/22/2023 14:35	5,203	12	13.2	18
Green Peter Head of Reservoir - Middle Santiam Arm	5/22/2023 20:35	5,071	11.9	12.9	18.3
Lookout Point Head of Reservoir - Black Canyon Boat Ramp	5/30/2023 10:35	9,741	11.9	12.5	13.2
Hills Creek Head of Reservoir - Bingham Boat Ramp	6/5/2023 10:35	9,817	12.9	13.2	11.4
Fall Creek Head of Reservoir	6/12/2023 15:00	9,642	16.5	17.4	19
Detroit Head of Reservoir - Breitenbush River	7/13/2023 9:35	7,000	11.5	11.5	12.5
Detroit Head of Reservoir - North Santiam River	7/13/2023 11:45	6,640	11.5	13.1	13

Release Location	Release Date	N	Transport Temp Start	Transport Temp End	Release Site Temp
Foster Tailrace	8/23/2023 16:40	1,031	12.7	11.7	10
Foster Head of Reservoir	8/24/2023 10:10	2,063	13.1	13.3	15.3
Cougar Head of Reservoir	8/29/2023 11:40	5,151	14.2	11.8	10.1
Lookout Point Head of Reservoir - Black Canyon Boat Ramp	9/18/2023 8:25	5,000	12.9	13	13.6
Lookout Point Forebay - Signal Point	9/18/2023 17:10	5,004	14	14.9	20.9
Dexter Dam Tailrace - Pengra Boat Ramp	9/19/2023 11:40	2,011	12.6	17.7	19.3
Green Peter Head of Reservoir - Quartzville Creek Arm	9/20/2023 14:10	2,518	11.2	11.9	14.8
Green Peter Head of Reservoir - Middle Santiam Arm	9/21/2023 13:50	2,508	10.1	11.2	12.5
Detroit Head of Reservoir - Breitenbush River	9/26/2023 10:55	5,002	7.6	9.3	10.3
Detroit Head of Reservoir - North Santiam River	9/26/2023 16:10	4,999	6.9	8.9	10.5
Big Cliff Dam Tailrace	9/27/2023 15:45	8,009	7.1	10.7	12.7
Fall Creek Head of Reservoir	9/28/2023 14:45	5,006	11.6	12.2	13.8
Fall Creek Dam Tailrace	9/28/2023 19:25	1,001	12.5	16.3	18.3
Cougar Head of Reservoir	10/2/2023 14:25	5,006	10.5	9.9	8.3
Cougar Head of Reservoir	10/2/2023 19:10	3,006	8.8	9.1	8.7
Green Peter Head of Reservoir - Quartzville Creek Arm	10/3/2023 12:55	2,502	11	11.8	12.5
Green Peter Head of Reservoir - Middle Santiam Arm	10/4/2023 14:45	2,516	11.5	12.6	13.3
Green Peter Tailrace - Sunnyside	10/9/2023 16:10	4,002	11.5	16.1	18.1
Foster Head of Reservoir	10/10/2023 14:25	5,001	11.5	12.2	13.2
Foster Tailrace	10/11/2023 15:20	4,000	10.6	11.3	12
Cougar Head of Reservoir	10/18/2023 11:55	4,000	11.3	10	8
Cougar Forebay	10/18/2023 18:05	5,010	13.2	13.6	15.4
Cougar Tailrace	10/19/2023 12:45	4,000	11.2	11.7	10.5
Fall Creek Head of Reservoir	11/6/2023 15:45	5,000	10.1	10.8	10.8
Fall Creek Dam Tailrace	11/6/2023 19:05	1,000	9.4	9.4	11.3
Hills Creek Head of Reservoir - Bingham Boat Ramp	11/7/2023 15:50	5,000	9.2	9.3	8.7
Hills Creek Mid Reservoir - Packard Creek Boat Ramp	11/8/2023 15:20	5,000	7.7	12.3	14.3
Hills Creek Dam Tailrace	11/9/2023 14:40	3,000	7	10.5	12.5
Cougar Head of Reservoir	11/13/2023 13:15	4,005	9.1	9.3	8

Release Location	Release Date	N	Transport Temp Start	Transport Temp End	Release Site Temp
Cougar Forebay	11/14/2023 15:15	5,000	8.9	9.3	8.1
Cougar Tailrace	11/15/2023 11:45	2,412	9	9.3	8.4

Table 4. PIT tag recovery summary at established interrogation sites, rotary screw traps (RST), and reservoir sampling locations. Recoveries during screw trap efficiency testing that were recaptured during the test (i.e., within one week of release) are not included in this table.

Observation Location	Season Total	Reporting Period Total
Big Cliff Dam-8 ft	6	1
Cougar Dam Head of Reservoir-5 ft	3	1
Cougar Dam-PH 1	2	0
Cougar Dam-PH 2	2	0
Cougar Dam-RO	1,288	773
DEX - Dexter Dam (USACE), Middle Fork Willamette River	2	0
Dexter Dam Tailrace-5 ft	5	2
Fall Creek Dam Tailrace-8 ft	434	306
Green Peter Tailrace - Middle Santiam River-8 ft	33	7
HCR - Hills Creek Dam, Middle Fork Willamette River	14	0
Hills Creek Dam-PH	14	8
Hills Creek Dam-RO	1	1
LD1 - Lebanon Dam South Ladder	34	15
LD2 - Lebanon Dam North Ladder	25	10
LD3 - Lebanon Dam Diversion Bypass	53	31
LD4 - Lebanon Dam Spillway	20	11
Lookout Dam Tailrace-PH 1	2	2
Lookout Dam Tailrace-Spill	1	1
Lookout Point Reservoir	8	3
NSANTR - North Santiam River, Oregon	2	0
PD7 - Columbia River Estuary rkm 70	14	3

## Reservoir Distribution Summary

Reservoir sampling during the reporting period was conducted using 30' small mesh suspended gill nets on Lookout Point Reservoir (11/19/2023-11/25/2023 and 11/26/2023-12/02/2023) (Table 5). Sampling was not conducted on Green Peter Reservoir during this period due to access being deemed unsafe. Cramer Fish Sciences experienced a low catch rate during both weeks of the sampling period with three non-target species in week 47, and one target species in week 48 in total. Lookout Point reservoir water surface temperatures continued to drop reaching an average of 8.2 C (Table 6) by week 48.

On Lookout Point Reservoir, surface temperatures at netting locations averaged 10.2 C during week 47 (11/19/2023-11/25/2023) (Table 6). Turbidity remained high throughout the reservoir with secchi disk measurements averaging 0.15m. Suspended gill nets were set at a range of depths (0m-2m, 4m-6m, 9m-11m, 12-14m) now that the target thermocline temperature (15 C) could not be sampled due to the breakdown of thermal stratification and lowering temperatures. Over three days of sampling, three non-target species were captured. One juvenile walleye (fork length 168mm), one juvenile white crappie (fork length 78mm), and one black crappie (fork length 305mm) were captured in the suspended gill nets. Zero Chinook were captured during week 47.

During week 48 (11/26/2023-12/02/2023), surface temperatures in Lookout Point at net sites averaged 8.2 C (Table 6). Turbidity was high throughout the reservoir with secchi disk measurements ranging 0.15-0.20 m. Over four days of sampling, one hatchery origin Chinook (fork length 144 mm) was captured in the suspended gill nets at a depth of 0-2m. This fish was identified as part of Environmental Assessment Services' trap efficiency study (right pelvic fin clip). Zero non-target species were captured during week 48.

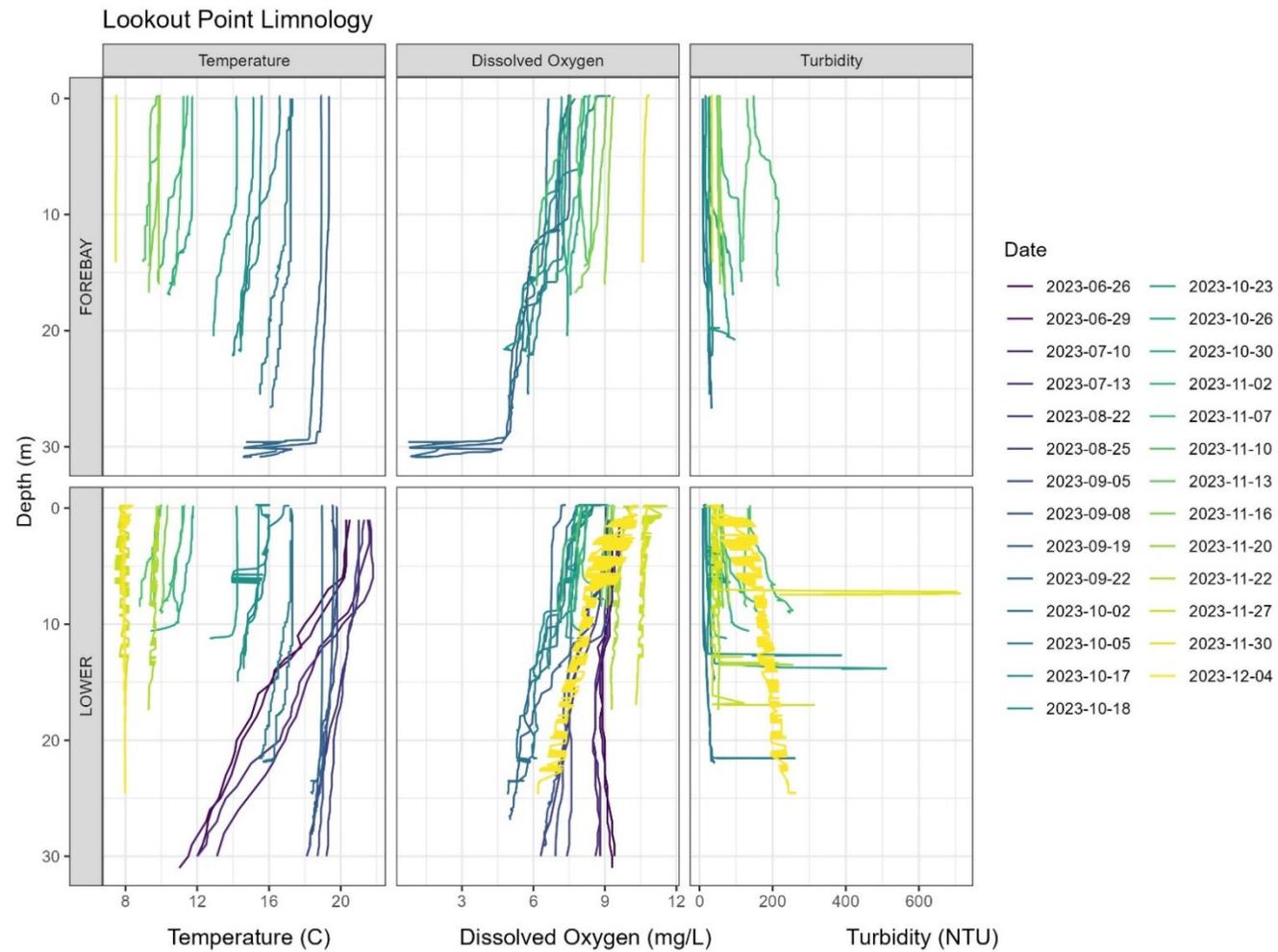


Figure 1. Temperature, dissolved oxygen and turbidity profiles taken in the forebay and at the “lower” limnology station in Lookout Point Reservoir.

Table 5. Start and end date by statistical week.

Week	Start	End	Reservoir	Net Type	Effort
24	6/11/2023	6/17/2023	Green Peter	oneida	47.7 hours
25	6/18/2023	6/24/2023	Green Peter	box minnow	746.5 hours
25	6/18/2023	6/24/2023	Green Peter	oneida	304.1 hours
26	6/25/2023	7/1/2023	Lookout Point	box minnow	682.7 hours
26	6/25/2023	7/1/2023	Lookout Point	oneida	217.1 hours
27	7/2/2023	7/8/2023	Green Peter	box minnow	689.1 hours
27	7/2/2023	7/8/2023	Green Peter	oneida	298.0 hours
28	7/9/2023	7/15/2023	Lookout Point	box minnow	642.5 hours
28	7/9/2023	7/15/2023	Lookout Point	oneida	210.6 hours
29	7/16/2023	7/22/2023	NA	NA	0 hours
30	7/23/2023	7/29/2023	NA	NA	0 hours
31	7/30/2023	8/5/2023	Green Peter	Gill Net – 30'	537.7 hours
31	7/30/2023	8/5/2023	Green Peter	Gill Net – 80'	70.1 hours
32	8/6/2023	8/11/2023	NA	NA	0 hours
33	8/13/2023	8/19/2023	Green Peter	Gill Net – 30'	215.9 hours
34	8/20/2023	8/25/2023	Lookout Point	Gill Net – 30'	600.8 hours
35	8/27/2023	9/2/2023	Green Peter	Gill Net – 30'	632.3 hours
36	9/3/2023	9/9/2023	Lookout Point	Gill Net – 30'	395.3 hours
37	9/10/2023	9/16/2023	Green Peter	Gill Net – 30'	472.8 hours
38	9/17/2023	9/23/2023	Lookout Point	Gill Net – 30'	566.0 hours
39	9/24/2023	9/30/2023	Green Peter	Gill Net – 30'	545.1 hours
40	10/01/2023	10/07/2023	Lookout Point	Gill Net – 30'	548.6 hours
41	10/08/2023	10/14/2023	NA	NA	0 hours
42	10/15/2023	10/21/2023	Lookout Point	Gill Net – 30'	563.5 hours
43	10/22/2023	10/28/2023	Lookout Point	Gill Net – 30'	573.5 hours
44	10/29/2023	11/04/2023	Lookout Point	Gill Net – 30'	567.1 hours
45	11/05/2023	11/11/2023	Lookout Point	Gill Net – 30'	566.4 hours
46	11/12/2023	11/18/2023	Lookout Point	Gill Net – 30'	844.3 hours
47	11/19/2023	11/25/2023	Lookout Point	Gill Net – 30'	579.9 hours
48	11/26/2023	12/02/2023	Lookout Point	Gill Net – 30'	571.3 hours

Table 6. Mean surface water temperature measure during each trap net deployment.

Week	Reservoir	Mean Water Surface Temperature °C
24	Green Peter	20.5
25	Green Peter	21.1
26	Lookout Point	21.7
27	Green Peter	24.1
28	Lookout Point	23.3
29	NA	NA
30	NA	NA
31	Green Peter	24.7

Week	Reservoir	Mean Water Surface Temperature °C
32	NA	NA
33	Green Peter	25.5
34	Lookout Point	21.4
35	Green Peter	23.6
36	Lookout Point	20.6
37	Green Peter	22.9
38	Lookout Point	19.8
39	Green Peter	21.0
40	Lookout Point	17.9
41	NA	NA
42	Lookout Point	16.1
43	Lookout Point	14.5
44	Lookout Point	11.9
45	Lookout Point	10.7
46	Lookout Point	10.7
47	Lookout Point	10.2
48	Lookout Point	8.2

Table 7. Summary of catch by reservoir. BLC - Black Crappie, BLG - Bluegill, CHS – Chinook salmon, CUT - Cutthroat trout, LMB - Largemouth bass, LSS - Large-scale sucker, NPM - Northern Pike Minnow, SMB - Smallmouth Bass, WAL - Walleye.

Week	Reservoir	Species	Catch
24	Green Peter	BLC	1
24	Green Peter	BLG	128
24	Green Peter	SMB	2
25	Green Peter	BLC	1
25	Green Peter	BLG	220
25	Green Peter	CUT	1
25	Green Peter	LMB	52
25	Green Peter	NPM	1
25	Green Peter	SMB	6
26	Lookout Point	BLG	6,474
26	Lookout Point	CHS	9
26	Lookout Point	LMB	1
26	Lookout Point	LSS	1
26	Lookout Point	SMB	283
26	Lookout Point	WAL	19
27	Green Peter	BLC	1
27	Green Peter	BLG	253
27	Green Peter	CUT	2
27	Green Peter	LMB	2

<b>Week</b>	<b>Reservoir</b>	<b>Species</b>	<b>Catch</b>
27	Green Peter	NPM	2
27	Green Peter	SMB	25
28	Lookout Point	BBH	1
28	Lookout Point	BLG	6,000
28	Lookout Point	CHS	9
28	Lookout Point	LMB	1
28	Lookout Point	NPM	3
28	Lookout Point	SMB	105
28	Lookout Point	SMG	4
28	Lookout Point	WAL	1
31	Green Peter	KOK	6
31	Green Peter	RBT	11
31	Green Peter	SMB	2
34	Lookout Point	BLG	2
34	Lookout Point	WAL	29
35	Green Peter	KOK	2
36	Lookout Point	WAL	6
38	Lookout Point	BLG	4
38	Lookout Point	LMB	1
38	Lookout Point	RMT	1
38	Lookout Point	WAL	53
39	Green Peter	BLG	1
39	Green Peter	CHS	1
39	Green Peter	CUT	1
39	Green Peter	KOK	8
40	Lookout Point	BLC	1
40	Lookout Point	CHS	1
40	Lookout Point	WAL	25
40	Lookout Point	WHC	1
42	Lookout Point	CHS	1
42	Lookout Point	WAL	18
43	Lookout Point	BLC	1
43	Lookout Point	CHS	2
43	Lookout Point	WAL	35
43	Lookout Point	WHC	2
44	Lookout Point	WAL	9
44	Lookout Point	WHC	1
45	Lookout Point	WAL	4
46	Lookout Point	CHS	5
46	Lookout Point	UNK	1
47	Lookout Point	BLC	1
47	Lookout Point	WAL	1

Week	Reservoir	Species	Catch
47	Lookout Point	WHC	1
48	Lookout Point	CHS	1

Table 8. Detailed catch summary of target species.

Week	Reservoir	Zone	Species	Catch	length_min	length_mean	length_max
26	Lookout Point	MIDDLE	CHS	4	80	87.2	92
26	Lookout Point	UPPER	CHS	5	73	83.6	95
28	Lookout Point	UPPER	CHS	8	77	84.8	100
38	Lookout Point	MIDDLE	CHS	2	132	134	136
39	Green Peter	UPPER	CHS	1	119	119	119
40	Lookout Point	UPPER	CHS	1	140	140	140
42	Lookout Point	MIDDLE	CHS	1	159	159	159
43	Lookout Point	LOWER	CHS	1	130	130	130
43	Lookout Point	LOWER	CHS	1	139	139	139
46	Lookout Point	LOWER	CHS	6	130	151.8	202
48	Lookout Point	LOWER	CHS	1	144	144	144

## Appendix A. Release Site Maps

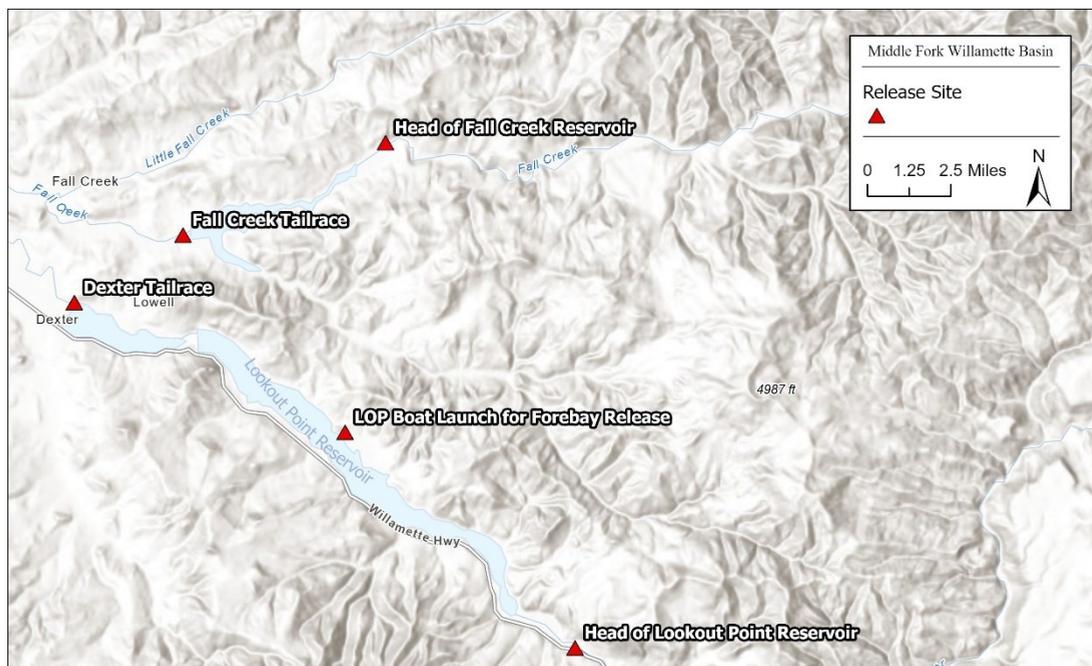


Figure 1. Map of Lookout Point, Dexter tailrace and Fall Creek release locations within the Middle Fork Willamette Basin.

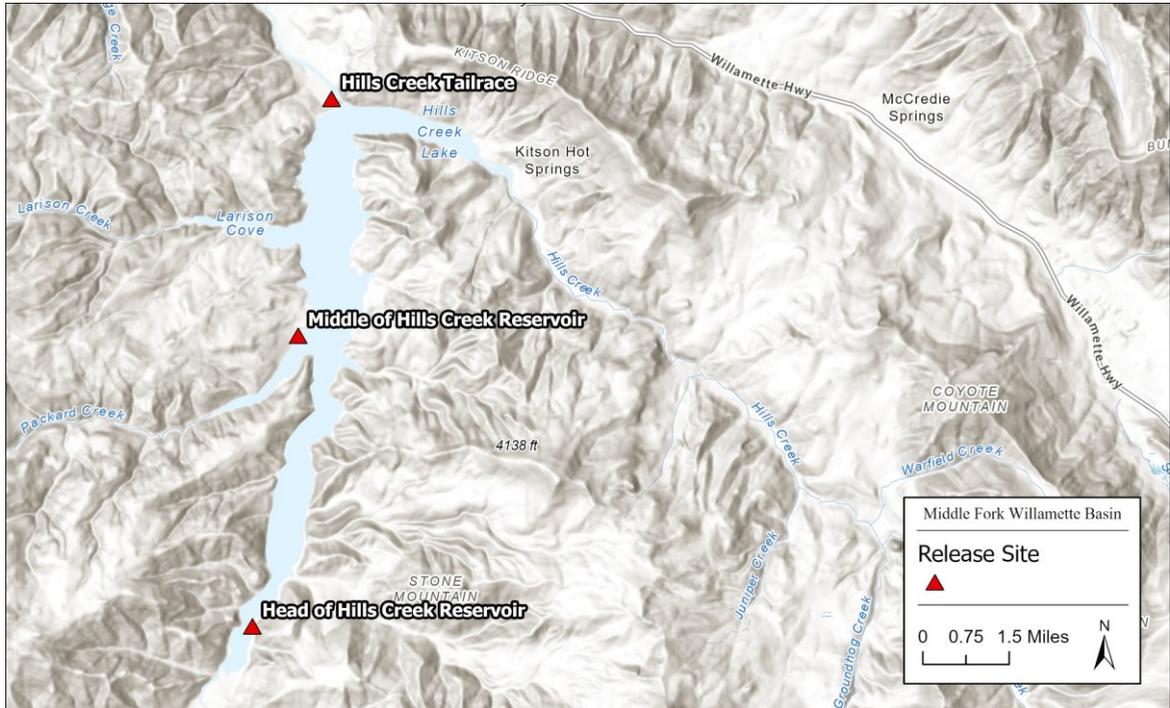


Figure 2. Map of Hills Creek Reservoir release locations within the Middle Fork Willamette Basin.

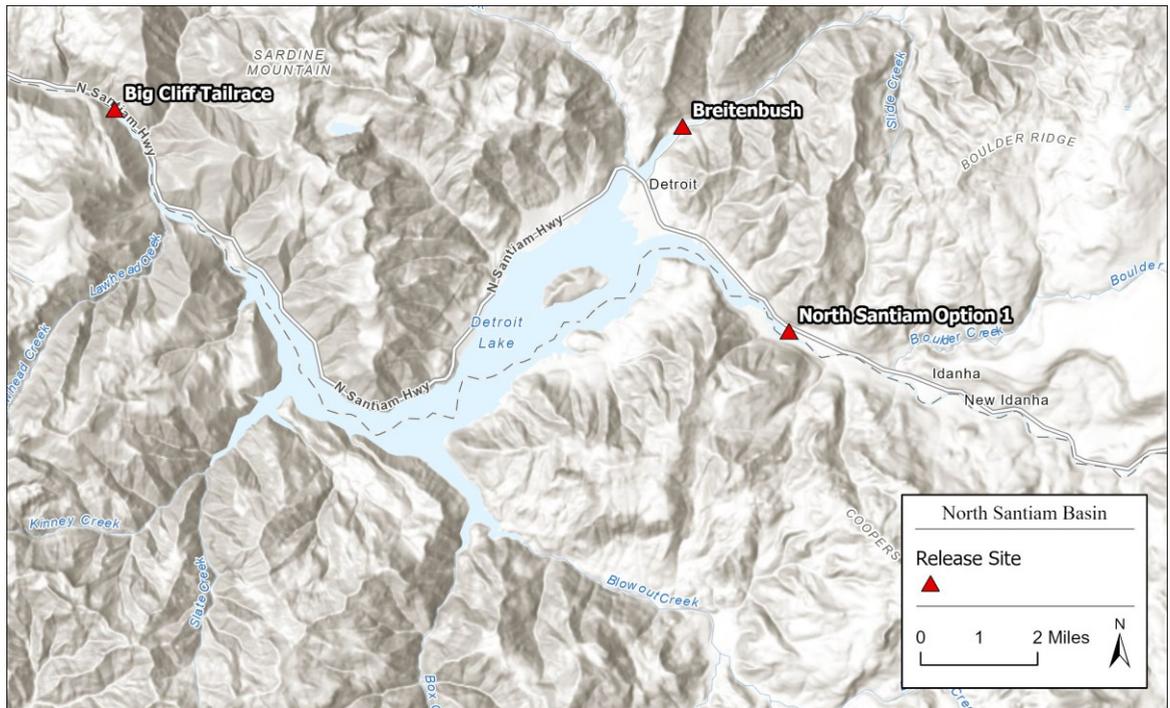


Figure 3. Map of release locations within the North Santiam Basin.

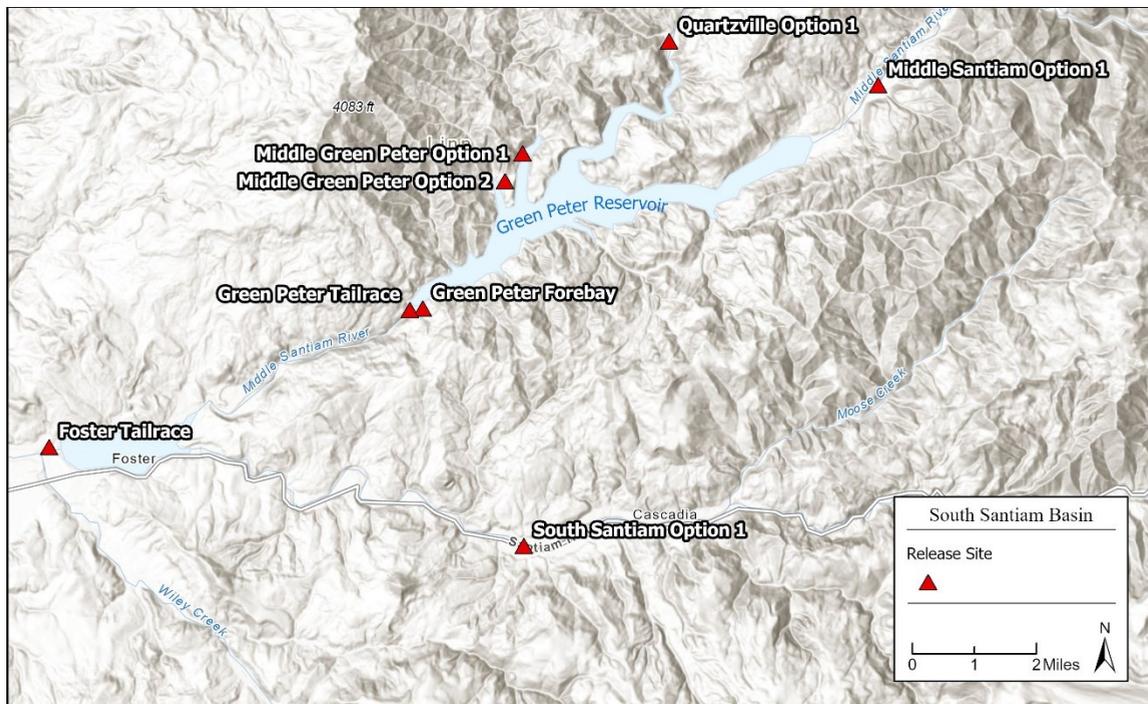


Figure 4. Map of release locations in the Middle/South Santiam basin including Green Peter Reservoir.

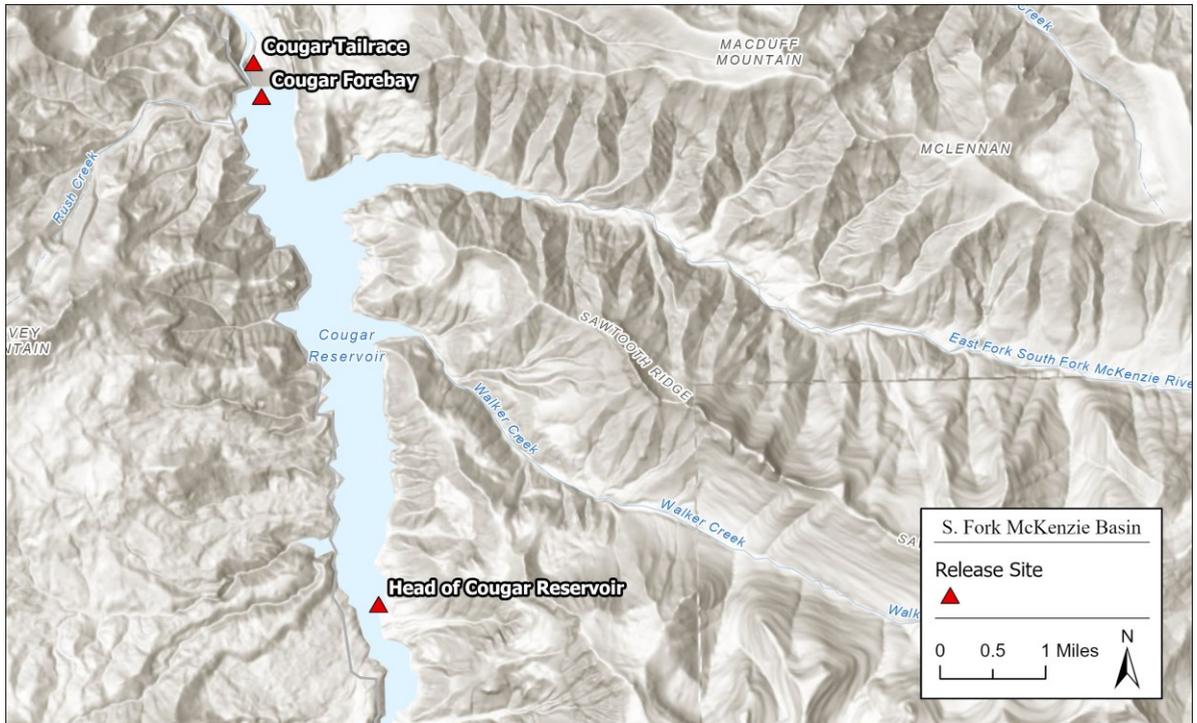


Figure 5. Map of release locations at Cougar Reservoir.

## Appendix B. Reservoir Sampling Zones

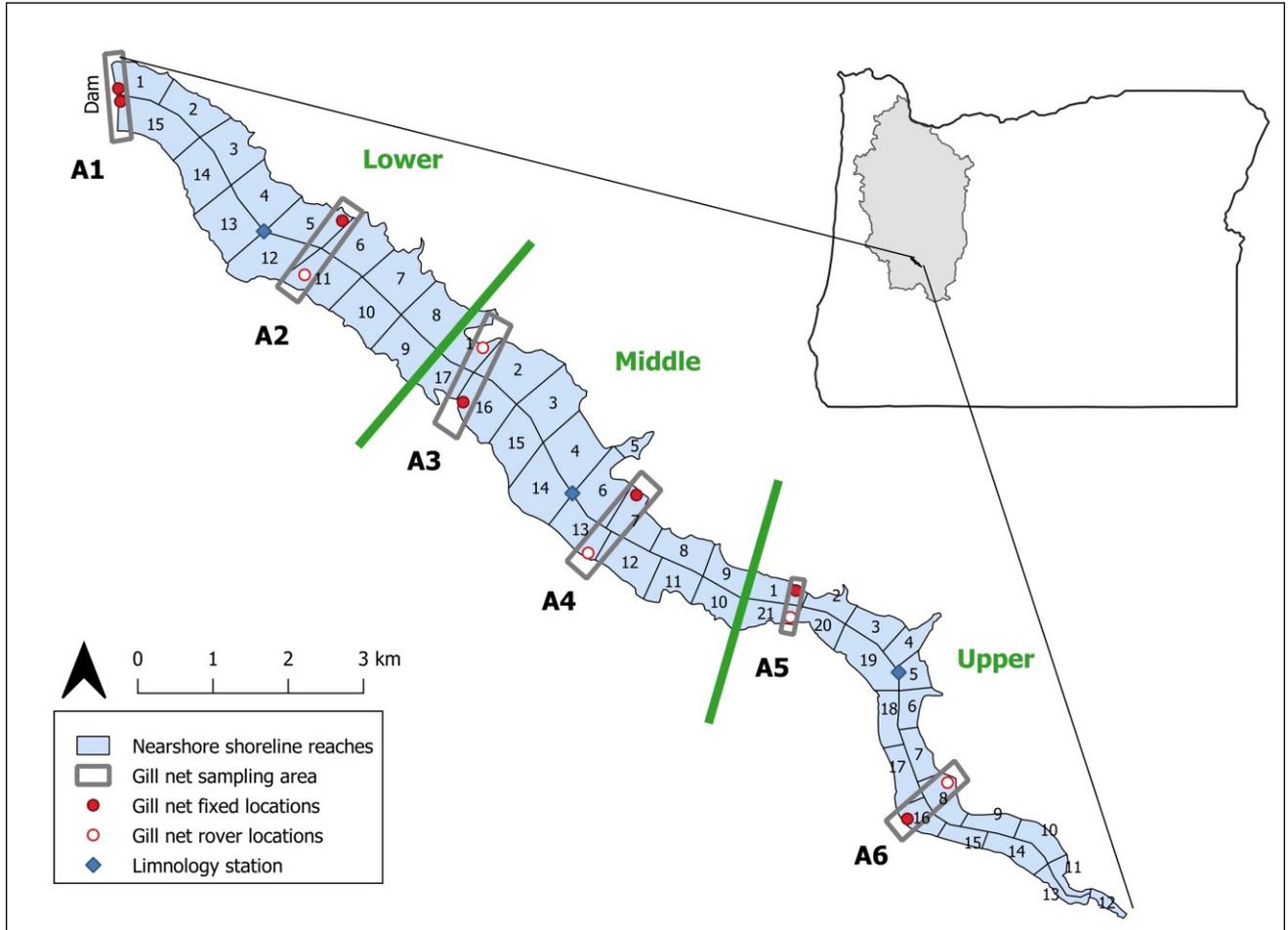


Figure 6. Map of Lookout Point Reservoir nearshore shoreline reaches, reservoir zones (lower, middle and upper), gill netting sampling areas and limnological stations.

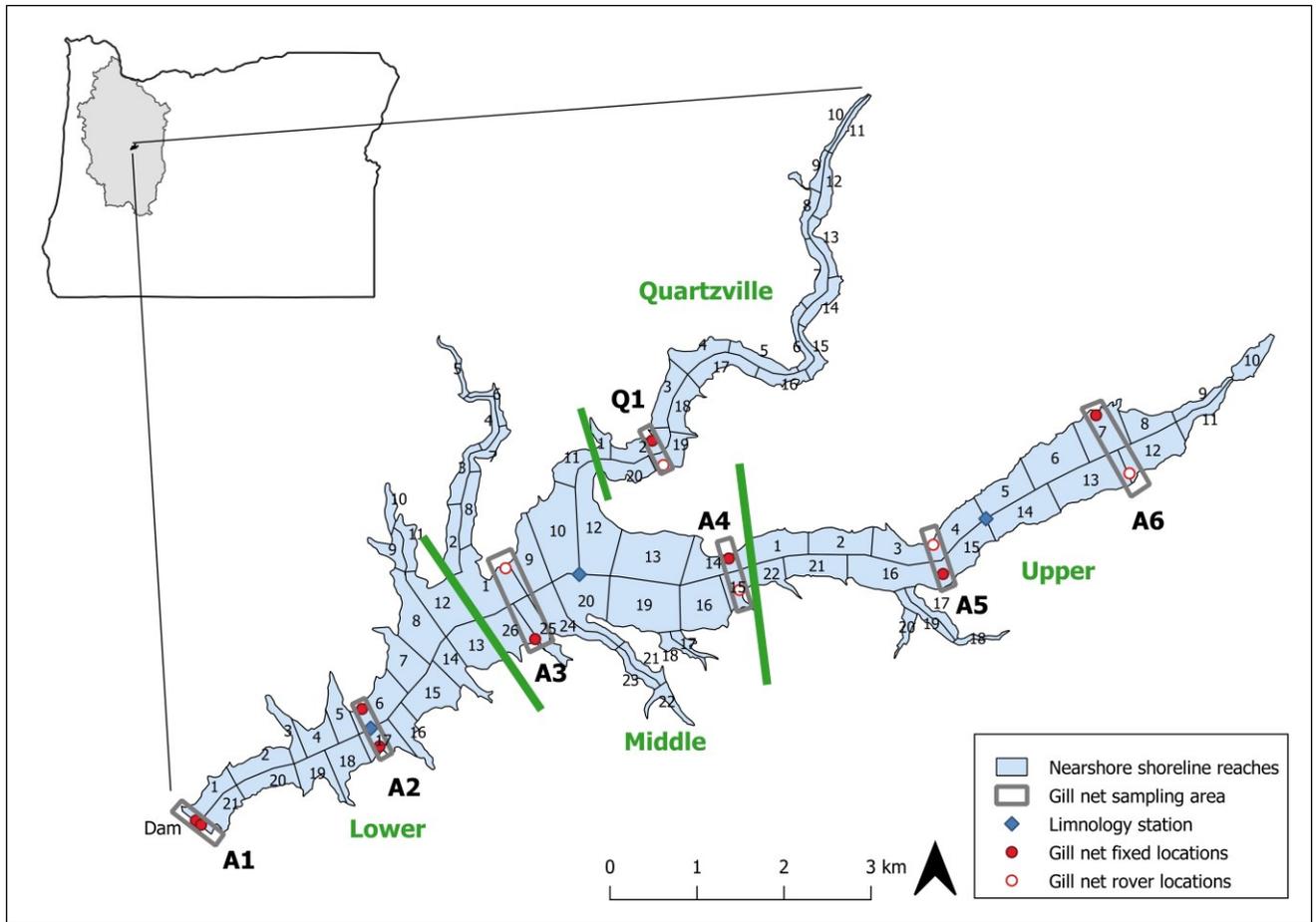


Figure 7. Map of Green Peter Reservoir nearshore shoreline reaches, reservoir zones (lower, middle and upper), gill netting sampling areas and limnological stations.